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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,695	12/31/2003	Albert A. Vierheilig	113222.146 US1	2181
28089 7590 04/10/2007 WILMER CUTLER PICKERING HALE AND DORR LLP 399 PARK AVENUE NEW YORK, NY 10022			EXAMINER SINGH, PREM C	
			ART UNIT	PAPER NUMBER
			1764	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	04/10/2007	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/10/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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**Office Action Summary**

Application No.

10/749,695

Applicant(s)

VIERHEILIG ET AL.

Examiner

Prem C. Singh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-136 is/are pending in the application.
- 4a) Of the above claim(s) 93-99 and 121-136 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-92 and 100-120 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 01/17/2007.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Response to Amendment*

Correction to the Abstract and incorporation of continuation data of prior application number 10/729,270 filed 12/05/2003 is noted.

### ***Claim Rejections - 35 USC § 102 / § 103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

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3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

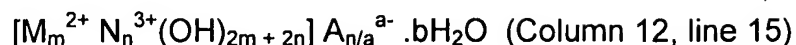
This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-92 and 100-120 are rejected under 35 U.S.C. 102(b) as anticipated by Vierheilig (US Patent 6,028,023) alone or as further evidenced by Stamires et al (US 2002/0110520 A1) and in the alternative, under 35 U.S.C. 103(a) as obvious over Vierheilig (US Patent 6,028,023) in view of Stamires et al (US 2002/0110520 A1).

Claim 1.

Vierheilig discloses a process for reducing sulfur in a FCC unit to refine petroleum (Column 15, lines 15-18). Vierheilig further discloses that hydrotalcite-like (HTL) compounds may be used as sorbents especially SO<sub>x</sub> sorbent and hydrocarbon cracking catalyst for use in fluidized bed systems." (Column 16, lines 10-16). According to Vierheilig, HTL compounds will most preferably have a chemical structure:

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"Wherein  $M^{2+}$  and  $N^{3+}$  are cations, m and n are selected such that the ratio of m/n is about 1 to about 10, a will have a value of 1, 2 or 3, A is an anion with charge of -1, -2 or -3, and b will range between 0 and 10, are highly preferred. The most preferred elements for "M" in the above structure will be Mg, Ca, Zn, Mn, Co, Ni, Sr, Ba, Fe and Cu. The most preferred element for "N" will be Al, Mn, Fe, Co, Ni, Cr, Ga, B, La and Ce. The most preferred elements for "A" with charge  $a^-$  will be  $CO_3^{2-}$ ,  $NO_3^-$ ,  $SO_4^{2-}$ ,  $Cl^-$  and  $OH^-$ ,  $Cr^-$ ,  $I^-$ ,  $SO_4^{2-}$ ,  $SiO_3^{2-}$ ,  $HPO_3^{2-}$ ,  $MnO_4^{2-}$ ,  $HGaO_3^{2-}$ ,  $HVO_4^{2-}$ ,  $ClO_4^-$  and  $BO_3^{2-}$  and mixtures thereof". (Column 12, lines 16-27). The process of making HTL compounds comprises:

(a) "Preparing a reaction mixture comprising a divalent metal containing compound and a trivalent metal containing compound (Column 13, lines 16-18) forming an initial slurry or precipitation synthesis reaction" (Column 8, lines 12-14).

(b) "The reaction product may be subjected to low temperature (i.e., less than 250°C) drying process before heat treatment (Column 8, lines 35-39).

(c) "Drying process may also include the physical formation of those powders, pellets, beads, extrudates, microspheroidal spheres or granule forms for use as catalysts, sorbents, etc." (Column 8, lines 40-45).

(d) "The heat treatment step involves heating synthesis reaction products to a temperature in the range of about 300°C to about 850°C." (Column 8, lines 49-52).

(e) "Heat treated product is then subjected to a hydration step." (Column 9, lines 49-51).

(f) "The hydrated product may again be collapsed by a second heat treatment step." (Column 10, lines 21-22).

Vierheilig further discloses in Table III (Column 20, lines 40-45) that the hydrotalcite-like (HTL) compound thus produced has XRD patterns mostly closely matching ICDD Card 35-965 (Column 20, lines 31-35).

It is to be noted that Vierheilig invention uses the term "heat treatment" in steps (d) and (e), the invention also uses the term "calcination" for heating beyond 300°C (Column 3, lines 13 and 43).

Vierheilig further discloses, "The HTL compounds of this invention can be formed into various shapes (particles, microspheroidal particles, extrudates, pellets)." (Column 22, lines 25-27).

Although Vierheilig is silent as to the reduction of sulfur in gasoline produced in an FCC unit, the invention does disclose the use of HTL compound in an FCC unit as a catalyst per se (e.g., as hydrocarbon cracking catalyst for fluid bed systems), as SO<sub>x</sub> binding agents, or as catalyst binder materials for other catalyst materials (See column 7, lines 39-42; column 16, lines 13-16). Thus, under 35 U.S.C. 102 (b), the presence of HTL compound in the FCC unit would appear to inherently produce gasoline with reduced sulfur.

Stamires discloses a similar shaped HTL composition (See page 2, paragraph 0041) produced by similar steps (See page 2, paragraphs 0034-0042; page 3,

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paragraphs 0042-0057; page 4, paragraphs 0059-0067) as Vierheilig and further discloses, "These compositions appear to be highly suitable for use as an additive or as a matrix for catalysts for hydrocarbon conversion, e.g., FCC and HPC. They are especially suitable for sulfur removal from the gasoline and diesel fraction in FCC, SO<sub>x</sub> and NO<sub>x</sub> removal in FCC, and as a metal trap." (Page 4, paragraph 0068).

Thus, it is clear that in Vierheilig process also the gasoline produced by FCC will have reduced sulfur as evidenced by Stamires.

Claims 2, 17, 32, and 46.

Vierheilig's disclosure in claim 1 includes magnesium as X and aluminum as Y.

Claims 3, 12, 18, 26, 33, 40, 47, 53, 62, 72, 78-80, and 106-108.

Vierheilig discloses in Table I the molar ratio of Mg:Al of 2/1, 3/1, and 5/1 (Column 18, lines 6-8). Vierheilig discloses, "This is evidenced by the presence of all major peaks of an HTL compound, including peaks at about 11.271 degrees.

Claims 4, 19, 34, 85, 86, 116, and 117.

Vierheilig discloses, "Any number of well known oxidants may be employed in conjunction with applicant's HTL compounds. Such oxidants would include, for example, platinum, those compounds which form oxides of the rare earth metals, oxides of transition metals etc." (Column 17, lines 56-60).

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Claims 5, 35, and 48.

Vierheilig discloses use of 15 wt% of oxidant (12%  $\text{CeO}_2$  and 3%  $\text{V}_2\text{O}_5$ ) in the HTL compound (Column 20, lines 20-22).

Claims 6, 7, 20, 21, 31, 45, 63, 73, 87, 88, and 118-120.

Vierheilig discloses, "HTL compounds may comprise at least one HTL compound made by the process of this invention and at least one, chemically different, binder, matrix, or support, say calcium aluminate." (Column 18, lines 36-42).

Claims 8-11, 22, 23, 24, 25, 36-39, 49-52, 58-61, and 68-71.

All the limitations of these claims are disclosed by Vierheilig under claim 1.

Claims 13-15, 27-29, 41-43, 54-56, 64-66, 74-76, and 90-92.

Vierheilig discloses, "Any of the HTL compounds may be used in FCC systems wherein the  $\text{SO}_x$  sorbent particle species comprises from about 10 to about 90 wt% of the overall  $\text{SO}_x$  additive system. Such an overall,  $\text{SO}_x$  additive system will, in turn, normally comprise from about 0.5 to about 10.0 wt % of a bulk hydrocarbon cracking catalyst (e.g. zeolite)  $\text{SO}_x$  additive system." (Column 16, lines 1-9).

It is to be noted that bulk hydrocarbon cracking catalyst is the inventory of the regenerator.



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Claims 16 and 44.

Claims 16 and 44 have all the limitations of claims 1 and 4, already discussed above.

Claims 30 and 57.

Claims 30 and 57 have all the limitations of claim 1 and discussed before.

Claim 67.

Claim 67 has all the limitations of claims 1, 4 and 7, and discussed before.

Claim 77.

Claim 77 has all the limitations of claim 3 with only difference of XRD pattern displaying at least a reflection at a two theta peak position at about 43 degrees and 62 degrees.

Vierheilg discloses reflection at a two-theta position at about 43 degrees and 62 degrees (See column 21, lines 1-3).

Claims 81-83.

Claims 81-83 have the limitation of a shaped body which has already been discussed under claim 1 (c).

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Claims 84 and 112.

Vierheilg discloses in Table I that the HTL compound has MgO 52.1 wt% or more (Column 18, lines 9-11).

Claim 89.

Vierheilg uses a binder made from a material selected from the group of zinc titanate (See column 15, lines 53-57).

Claims 100-104.

Claims 100-104 have all the limitations of claims 1 and 77 and have been discussed before.

Claim 105.

Vierheilg does not specifically mention about heating the HTL compound prior to contacting with the feedstock.

Vierheilg does mention the use of HTL compound as hydrocarbon cracking catalyst in the FCC process. Since FCC process is carried out at elevated temperatures, it would have been obvious to one skilled in the art at the time the invention was made to heat the HTL compound prior to contacting with the feedstock for effective sulfur removal in the process.

Claims 109-111.

Claims 109-111 have all the limitations of claim 1 and discussed before.

Claim 113-115.

Claims 113-115 have all the limitations of claims 1 and 77 and discussed before.

***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-92, and 100-120 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-

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92, and 100-120 of copending Application No. 10/729,270. Although the conflicting claims are not identical, they are not patentably distinct from each other because the current Application uses a hydrotalcite like (HTL) compound which has an X-ray diffraction pattern with a two-theta peak position nearly identical to that found in an ICDD card selected from ICDD card 35-965; ICDD Card No. 22-0700; ICDD Card No. 35-1275; or ICDD Card No. 35-0964. The Co-pending Application 10/729,270 uses a HTL compound which has an X-ray diffraction pattern which has a two-theta peak position that resembles that found in an ICDD Card selected from ICDD card 35-965; ICDD Card No. 35-1275; or ICDD Card No. 35-0964. It would have been obvious to one skilled in the art to narrow down the selection from 4 ICDD cards to 3 ICDD cards and restrict the choice of HTL compound in the claimed invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Response to Arguments***

Applicant's arguments filed 01/17/2007 have been fully considered but they are not persuasive.

The Applicant argues that the claims are not obvious because the cited reference fails to disclose or demonstrate that sulfur in gasoline must also be removed along with SO<sub>x</sub>, as SO<sub>x</sub> is removed in or from the regenerator under an exothermic oxidizing

environment in direct contrast to sulfur in gasoline, which is removed in or from the reactor under an endothermic reducing environment.

The Applicant's argument is not persuasive because Vierheilig discloses, "The HTL (hydrotalcite like) compounds of this patent disclosure may be used as catalysts per se (e.g., as hydrocarbon cracking catalyst), as SO<sub>x</sub> binding agents, or as catalyst binder materials for other catalyst materials." (Column 7, lines 39-42). Thus, gasoline produced in Vierheilig invention will inherently have reduced sulfur. Also, the new rejection uses Stamires reference which explicitly discloses, "These compositions appear to be highly suitable for use as an additive or as a matrix for catalysts for hydrocarbon conversion, e.g., FCC and HPC. They are especially suitable for sulfur removal from the gasoline and diesel fraction in FCC, SO<sub>x</sub> and NO<sub>x</sub> removal in FCC, and as a metal trap." (Page 4, paragraph 0068).

Thus, the gasoline obtained by Vierheilig process will have reduced sulfur content, as further evidenced by Stamires invention.

The Applicant argues that Contrary to the Office Action's erroneous assertion, the claims are not obvious because the cited reference fails to disclose that sulfur in gasoline would also be removed. The mere fact that a certain thing, [such as sulfur in gasoline] may result from a given set of circumstances is not sufficient." In re Oelrich, 666 F.2d. 578, 581. The missing element must necessarily result from the references. In this case, the cited reference does not disclose that the sorbent material must remove sulfur in gasoline, as even expressly admitted in the Office Action. (Office Action page 5

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last paragraph). Consequently, the Office Action fails to demonstrate every aspect of all the claim limitations, as expressly required by the MPEP.

The Applicant's argument is not persuasive as discussed above.

The Applicant argues that independent claims 1, 16, 30, 44, 57, 67, 77, and 100 are not obvious because the Office Action not only fails to demonstrate that sulfur in gasoline must be reduced, but also fails to demonstrate a motivation to modify to remove sulfur. Nor has the Office Action demonstrated any expectation of success. As current independent claims are not obvious, all the claims dependent thereon are also not obvious.

The Applicant's argument is not persuasive because as explained earlier, Vierheilg process produces gasoline which will inherently have reduced sulfur which is further evidenced by Stamires invention.

The Applicant argues that the cited reference may disclose sorbing SO<sub>x</sub>; however, the cited reference does not disclose a method for reducing the concentration of sulfur in gasoline as even admitted in the Office Action and nor does the cited reference disclose the motivation to modify and a reasonable expectation of success of using the cited SO<sub>x</sub> sorbent to remove sulfur in gasoline in the reactor under an endothermic environment, as opposed to and in direct contrast to SO<sub>x</sub> which is removed from the regenerator under an exothermic oxidizing environment. The issue is not whether the cited reference may merely be modified to use the cited SO<sub>x</sub> sorbent to

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remove sulfur in gasoline in the reactor under an endothermic environment, but that the Office Action fails to demonstrate any suggestion or motivation to modify to use the cited SO<sub>x</sub> sorbent to remove sulfur in gasoline in the reactor under an endothermic environment as well as a reasonable expectation of success.

The Applicant's argument is not persuasive as discussed before.

The Applicant argues about claim 77 that the Office Action alleged that Claim 77 has all the limitations of claim 3 with only difference of XRD pattern displaying at least a reflection at a two theta peak position at about 43 degrees and 62 degrees. However, the Office Action expressly admits "Vierheilig does not specifically mention about two theta peak position at about 43 degrees and 62 degrees".

The Applicant's argument is not persuasive because Vierheilig discloses reflection at a two-theta position at about 43 degrees and 62 degrees (See column 21, lines 1-3).

The Applicant argues about claim 89 that the Office Action expressly admits "Vierheilig does not specifically mention using zinc titanate or zinc aluminate ...". Nonetheless, the Office Action erroneously alleged "but the invention does disclose using calcium aluminate as a support for the HTL compound. It would have been obvious to one skilled in the art at the time the invention was made to modify Vierheilig invention and use zinc aluminate as support because calcium aluminate and zinc

aluminate, both are functionally similar and it is expected that either of the supports will be effective in the sulfur removal from gasoline."

The Applicant's argument is not persuasive because Vierheilig uses a binder made from a material selected from the group of zinc titanate (See column 15, lines 53-57).

The Applicant argues about claim 105 that the Office Action expressly admits "Vierheilig does not specifically mention about heating the HTL compound prior to contacting with the feedstock." Nonetheless, the Office Action erroneously alleged that "Vierheilig does mention the use of HTL compound as hydrocarbon cracking catalyst and as a sorbent for SO<sub>x</sub> absorption in the FCC process. Since FCC process is carried out at elevated temperatures, it would have been obvious to one skilled in the art at the time the invention was made to modify Vierheilig invention and heat the HTL compound prior to contacting with the feedstock for effective sulfur removal in the process."

The Applicant's argument is not persuasive because Vierheilig uses the HTL compound as a catalyst in a fluid catalytic cracking process. One skilled in the art knows that catalytic cracking takes place at a temperature above ambient. Thus, it would have been obvious to heat the HTL compound before adding to the reactor to maintain the reactor temperature. If a cold additive/catalyst is added to the reactor, it will reduce the process temperature and adversely affect the product quality.




**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 7:00 AM- 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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